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TSMNI-D

TEST SET, RADIO

1. GENERAL. This procurement requires a portable radio test set with keypad entry of configuration and measurement parameters for use with radio receiving and transmitting equipment.

2. CLASSIFICATION. Type II, Class 3, Style C, and Color R in accordance with MIL-T-28800 for shipboard applications.

3. FUNCTIONAL REQUIREMENTS. The equipment shall be capable of signal generation, monitoring, amplitude level and frequency measurement, power measurement, modulation analysis and display, receiver signal-to-noise measurement, and spectrum analysis within the minimum specifications identified below.

3.1 RF signal generator.

3.1.1 Generator frequency range. 250 kHz to 999.99 MHz tuneable in increments of 100 Hz or less.

3.1.2 Generator frequency accuracy. Equal to the master oscillator (see 3.10).

3.1.3 Generator output power. Adjustable from -127 dBm to -20 dBm. Accuracy: ±4 dB.

3.1.4 Generator spectral purity. -15 dBc for harmonics, -40 dBc for all other spurious signals.

3.1.5 Modulation. FM or AM from an internal or external source, supplied microphone, or all simultaneously.

3.1.5.1 Frequency modulation.

3.1.5.1.1 Modulation deviation. 0 to 25 kHz peak from 250 kHz to 999.99 MHz.

3.1.5.1.2 Modulation frequency response. 5 Hz to 20 kHz (3 dB).

3.1.5.1.3 Residual FM. 100 Hz peak from 300 Hz to 3 kHz.

3.1.5.2 Amplitude modulation.

3.1.5.2.1 Percentage of modulation range. 0 to 70% with modulating frequencies from 10 Hz to 5 kHz. Carrier frequency range: 1 MHz to 500 MHz.

3.1.5.2.2 AM frequency response. 10 Hz to 10 kHz (3 dB).

3.1.5.3 Sweep function. Sweep capabilities shall be provided for the range in 3.1.1.

a. Sweep increment: 100 Hz or less.

b. Sweep rate: Adjustable from 100 to 9,999 ms.

3.2 RF signal monitor.

3.2.1 Monitor frequency range. 1 MHz to 999.99 MHz.

3.2.2 Monitor frequency accuracy. Equal to master oscillator (see 3.10).

3.2.3 Monitor input sensitivity. From 4 MHz to 999.99 MHz for 10 dB EIA SINAD: 2.0 uV at 15 kHz bandwidth, 7.0 uV at 100 kHz bandwidth.

3.2.4 Beat frequency oscillator. A beat frequency oscillator that provides an audible carrier indication shall be provided.

3.2.5 Monitor frequency error measurement. The monitor shall indicate the difference in frequency between a signal under test and a predetermined value entered by the operator.

3.2.5.1 Monitor frequency error measurement range. ±100 kHz or greater.

3.2.5.2 Monitor frequency error measurement resolution. 1 Hz or less for ranges to 100 Hz, and 100 Hz or less for ranges above 100 Hz.

3.2.6 Monitor FM deviation range. 0 to 100 kHz peak deviation. Accuracy: ±5% plus the peak residual FM at modulation frequencies of 30 Hz to 10 kHz.

3.2.7 Monitor AM percentage range. 0 to 100%. Accuracy: ±5% FS at modulation frequencies of 300 Hz to 10 kHz.

3.2.8 Monitor signal strength measurement. A means shall be provided to measure the relative level of off-the-air signals received by an antenna supplied with the instrument.

a. Frequency range: 1 MHz to 999.99 MHz.

b. Level range. -100 dBm to +10 dBm.

3.3 RF wattmeter. An RF wattmeter and load shall be provided to measure the power generated by units under test, and to terminate a 50-ohm system with an SWR of 1.2 or less.

a. Power range. 1W to 125W.

b. Accuracy. ±10% of indication.

c. Load. The RF load shall be capable of terminating 125W for at least one minute.

3.3.1 Wattmeter over-temperature protection. An over-temperature warning shall be provided.

3.4 Spectrum analyzer. A spectrum analyzer function shall be provided.

3.4.1 Analyzer frequency range. 1 MHz to 999.9 MHz.

3.4.2 Analyzer dynamic range. 70 dB or greater.

3.4.3 Analyzer scan modes. Selectable from 1 kHz/div to 10 MHz/div. A full scan mode shall be provided.

3.4.4 Analyzer sensitivity. -95 dBm or less.

3.5 Duplex generator. A duplex generator function shall be provided to test equipment transmitting and receiving simultaneously on frequencies offset from each other.

3.5.1 Duplex frequency offset. 0 to ±10 MHz with a resolution of 10 kHz or less.

3.5.2 Duplex output level. -35 dBm minimum into a 50-ohm load.

3.5.3 Duplex generator deviation. The carrier shall be capable of being frequency modulated at deviations from 0 to 20 kHz peak.

3.5.4 Duplex generator frequency response. 5 Hz to 20 kHz ±3 dB.

3.6 Oscilloscope. An oscilloscope function shall be provided to monitor the modulation characteristics of AM and FM signals.

3.6.1 Oscilloscope display size. At least five square inches.

3.6.2 Oscilloscope frequency response. DC to 500 kHz.

3.6.3 Oscilloscope vertical input ranges. 10 mV to 10 V/div.

3.6.4 Oscilloscope horizontal sweep rate. 10 us/div to 10 ms/div.

3.7 Frequency counter. A frequency counter function shall be provided to measure audio frequencies.

3.7.1 Counter frequency range. 10 Hz to 20 kHz with a resolution of 1 Hz or less. Accuracy: ±2 counts.

3.8 AF signal generator. An audio frequency signal generator shall be provided to generate the tones required by various two tone signaling systems.

3.8.1 AF generator frequency range. 5 Hz to 20 kHz with a resolution of 1 Hz or less.

3.8.2 AF generator output level. 2.5 Vrms minimum into 600 ohms.

3.9 SINAD meter. A means shall be provided to measure the sensitivity of a receiver with respect to the ratio of the signal plus noise and distortion to noise and distortion.

3.9.1 SINAD meter frequency. The equipment shall provide a test signal modulated by 1 kHz to the receiver under test.

3.9.2 SINAD meter input range. 0.5 Vrms to 10 Vrms.

3.9.3 SINAD meter measurement range. 1 dB to 20 dB. Accuracy: ±1.5 dB at 12 dB SINAD.

3.10 Master oscillator frequency accuracy. 0.5 ppm.

3.10.1 Oscillator aging stability. ±3 ppm during the first year and ±1 ppm thereafter.

3.10.2 Oscillator temperature stability. 0 to 55°C: ±0.05 ppm.

3.11 Loudspeaker. The equipment shall contain an internal loudspeaker.

4. GENERAL REQUIREMENTS.

4.1 Power source. MIL-T-28800 nominal power source requirements are invoked. Operation at 400 Hz is not required. Maximum power consumption: 300W.

4.2 Weight. 21 kg (46 lb) maximum.

4.3 Digital interface. The equipment shall be provided with a digital interface in accordance with MIL-T-28800.

4.4 Lithium batteries. Per MIL-T-28800, lithium batteries are prohibited without prior authorization. A request for approval for the use of lithium batteries, including those encapsulated in integrated circuits, shall be submitted to the procuring activity at the time of submission of proposals. Approval shall apply only to the specific model proposed.